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THE STEAM TURBINE, THE STEAM ENGINE OF MAXIMUM SIMPLICITY AND HIGHEST THERMAL EFFICIENCY.

BY ROBERT H. THURSTON, MEMBER AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

Prof. Thurston states that while the ideal thermo-dynamic machine has not been constructed, and probably never will be, the close of the nineteenth century sees a remarkably close approximation to the ideal machine. The ideal construction is certainly reached in a machine in which there exists but a single moving element, and the ideal thermo-dynamic machine is approximated in a motor in which adiabatic expansion is secured, and friction and heat waste may be made sources of comparatively small loss. The elements of waste, conduction and radiation, and incomplete expansion, are probably capable of large reduction, with improved construction and continued experience in the apportionment of the apparatus to its work. The main purpose of this discussion is to summarize the work of the steam turbine to date, bringing out into relief facts indicating the essential importance of employing superheated steam in a machine in which it has seemingly no other than thermodynamic value, and of the use of condensation to enable the engineer to evade a loss and accomplish a purpose which have no counterparts in the case of the piston engine. Prof. Thurston presents the following conclusions:—

1. The steam turbine thermodynamically approximates in its real form more closely to the ideal than does any other type of heat motor. Its cycle lacks only the introduction of the Carnot compression. 2. It is entirely free from that waste, which in the real steam engine of common type constitutes usually, if not invariably, the most important of its extra thermodynamic losses. 3. It is peculiarly well fitted for use with those very high steam pressures as we now regard them, which must ultimately probably be resorted to by the engineer designing heat engines in his endeavor to further improve the efficiency of that class of motors. 4. It is only limited in speed of rotation by the strength of its materials of construction. 5. It is especially suitable for use with superheated steam, it having no rubbing parts on which lubrication may be difficult, in presence of superheated steam, and the limit to the superheat, so far as the motor is concerned, being only found at that point at which increased temperature of metal produces reduction of tenacity in objectionable amount. That limit, not as in earlier days of lubrication with animal oils, and still with other engines, is fixed with this machine at the boiler. 6. As to its operation, it is obvious that friction is peculiarly active for evil in this motor, and that small diameters of journal, freedom from contact of part with part, except as absolutely required by the construction, and minimizing fluid friction by superheated steam, and by securing as complete removal of the atmosphere, air, or vapor from about the revolving wheel as practicable, must be carefully sought in order that the mechanical efficiency of the machine shall be made a maximum. 7. The wastes of the steam turbine are all extra thermodynamic; the loss due the absence of adiabatic re-compression excepted. They consist of journal friction, which is made minimum by the use of a flooded bearing and a light ungent; fluid friction between disc and leakage steam, or suspended moisture in the jet, which may be made a minimum by superheating, and between the disc and its enclosing atmosphere of vapor, which may be minimized by the employment of a good condenser; loss of heat and steam by leakage, which may be reduced to a minimum by durable material, fine workmanship, and close fits; waste by incomplete expansion, which may be reduced to a limit determined by the finance of the case, by the resultant increase of friction and of cost due the necessary enlargement of the turbine; and, finally, thermodynamic waste by failure to secure that complete adiabatic re-compression of the fluid which is necessary to convert the Rankine-Clausius' into that of Carnot. The latter is a peculiarily difficult matter with the steam turbine, since it probably necessarily involves the employment of a separate vapor compression pump of special character, and an amount of added work and cost which may introduce losses more than compensating its gains.

ADMIRAL MELVILLE ON SUBMARINE BOATS.

Rear Admiral Melville expresses his distrust of the submarine boat in an article in the North American Review for April. In his opinion the public confidence in it is largely due to the fact that it "permits the imaginative to create for their satisfaction and delight all manner of weird and pleasing fancies." The Admiral recognizes the value of the ability to possibly reach unseen the enemy's fleet, discharge a torpedo, and disappear, but he thinks a semi-submerged boat better than a submarine. He thinks that naval officers should take more interest in the matter and urge a determination of the question of the value of submarines. He says: "From the time that the Senate and House Naval Committees look with favor upon these boats there will be a decreased construction of battleships, and the action of the Congress in striking out of the Naval Appropriation bill of 1901 all authorization for battleships and cruisers can certainly, in part, be traced to the belief that the submarine possesses many of the qualities claimed by its advocates. There need be no haste in deciding this question. As the boats are neither costly, large, nor intricate they can be built in six months. It is even claimed that a premium for speed construction would induce shipbuilders to construct a submarine in three months. There ought to be fifty firms in this country able to construct these boats in case of necessity."

MINNESOTA IN 1655.

Minnesota was discovered before Father Hennepin viewed the Falls of St. Anthony or Carver voyaged the Mississippi. In 1655 two French traders, Grosseillers and Radisson, came to Prairie Island, above Red Wing, and spent the winter. They remained during the summer to raise corn, and Radisson journeyed west hunting for months "from river to river," in a wonderfully fertile country, with herds of buffalo and antelope, flocks of pelican and schools of shovel-nosed sturgeon. This was the discovery of Minnesota by white men, according to the paper on "Explorations and Maps of Minnesota," read by Secretary Warren Upham before the Minnesota Historical Society.

The narrative of Radisson written in English after he entered the service of the Hudson Bay Company, was published in 1885. And, though it was known that he and Grosseilliers visited Minnesota, the date of their journey was uncertain. Aided by the researches of Campbell and the late Capt. Russell Blakely, Mr. Upham discovered that the Jesuit relations mentioned the absence of the two traders from Quebec from 1654 to 1656 on a remote journey. As they can be traced in the years following, it is presumed they visited Minnesota, and the narrative of Radisson sustains the presumption.

The first map of Minnesota was made in 1680, when Duluth, Hennepin and their companions desired to return to Montreal. Their route was from the Mille Lacs region down the Rum river to the Mississippi, and thence to the Wisconsin river. They then traveled up the Wisconsin and over portages to Green Bay, Wis. A Dakota chief traced the route on a paper and marked the portages.—St. Paul Pioneer Press.

THE WHITE STAR LINER CELTIC.

The White Star Liner Celtic, which Messrs. Harland & Wolff launched at Belfast, Ireland, on the 4th prox., is the largest vessel ever built. Though 5 ft. shorter than the Oceanic, her extra beam and depth give her greater tonnage, the figures for the two vssels being, respectively, 17,274 and 20,880 gross tons. The Celtic's displacement at a load draught of 36 ft. 6 in. is 36,700 tons, as against the Great Eastern's 32,160 tons. The Celtic's launching weight was 13,500 tons. The vessel has a breadth of 75 ft. and a depth of 49 ft., and is built on the cellular double-bottom principle. A flat bar keel is riveted on to the skin-plating, and through riveted on to the inner vertical keel, which is necessarily deeper below the engine spaces to ensure rigidity. The bilge strakes have been doubled, and so have the sheer strake and the strake next but one below it, whilst the upper deck stringers have also been doubled in the matter of plates, except at the extreme ends. All the riveting was done by hydraulic machinery, operated from the immense gantry used first in the building of the Oceanic. Whenever possible, machine riveting was followed, and altogether 167,095 inch-and-a-quarter rivets were so driven in the keel, double bottom, hull, and stringers. Six longitudinals worked intercostally; three on each side of the vertical keel increase the fore-and-aft strength of the structure, and with the thwartship vertical divisions make the cellular double bottom, which is bounded in the usual fashion with margin plates. The frame brackets are attached to the margin plates by double angles, and the floor plates have been similarly treated. Two intercostal keelsons add further to the longitudinal stiffness. Altogether there are nine decks, and at their levels there is a beam to every frame instead of one to every other frame. The decks are described as—lower orlop, orlop, lower middle, upper, bridge, boat, and sun deck. The labor of building a ship of so great proportions was necessarily heavy; its nature may be inferred from the fact that the shell plates numbered 1,392, were inch-and-a-quarter thick, averaged 30 ft. by 5 ft., and in some cases weighed four tons.

MAGNETIC SEPARATOR FOR ORES.

A machine which is attracting a good deal of attention in mining circles is the Wetherill magnetic separator. This is a machine for separating and purifying such ores as are attracted by an electro-magnet. The principle is not, of course, at all new, but this machine, by the great power of its magnets, and concentration of the magnetic field, attracts many substances which are not affected by an ordinary magnet. Even gold is sometimes slightly attracted, though this is not usual. One of the best machines of this type in existence forms part of the equipment of the mining department of McGill University, Montreal. In this machine the two magnets have a strength of 40,000 ampere-turns, and by the peculiar shaping of the pole-pieces, all this force is concentrated into a space the size of half a lead-pencil. The powdered ore is carried on a belt under the poles of an electro-magnet. Just over the belt, and under the magnet-pole, is a second belt, running crosswise. When the ore passes under the magnet, the magnetic particles of it rise and are held by the magnetic force to the under side of the upper belt. This belt carries them out of the field of the magnet, and they then drop into an appropriate receptacle. Meanwhile unmagnetic ore goes through the same treatment again, to insure a thorough separation, and is dumped into another receiver. It is thus possible to separate minerals, which are attracted by a magnet, from those which are not, and even to separate those which are attracted in different degrees.—Electricity.

DULUTH—SUPERIOR.

Special Correspondence to the Marine Record.

We have now 16,500,000 bushels of grain in the elevators here, 9,500,000 bushels of which is wheat and no chartering being done to speak of.

The Lake Shore Engine Works, Marquette, will fit out another life-boat for the department with one of their 12 h. p. engines. It is understood that this thirty-four foot boat will be placed at one of the coast stations.

The local dredges are making preparations for the appearance of clear water in the bay, which is expected towards the end of the month. The outlook for work in this line, while good, does not promise quite as well as last year, except on the government work. Capt. Barker, in addition to his contracts for the government, will do some work on the extension of the Ohio dock in Duluth, and also for the St. Paul & Western dock on Connors Point. The big hydraulic dredge will do the work for the Northwestern Fuel Co. dock on Superior Bay.

If the grande syndicate close their option on the property of the Cleveland-Cliffs Iron Co., Cleveland, it will be the worst possible thing that could happen to hundreds of people of the upper Peninsula. There is no firm who has done and seeks to do more real good to the people in their employ and service than the Cleveland-Cliffs. W. G. Mather, president of the company, is a noble man in this respect and is more than well liked by his people. This is an instance where it appears that the past and present conditions should be allowed to prevail.

Capt. A. B. Wolvin headed a list in appointing engineers for his boats this season, but it is not found that his say so puts the men to work. It is thought to be a sure pop here that the engineers will win their strike and down the owners, also the Lake Carriers' Association, at least, that is what I have had dinned into my ears for the past month, besides, on winning the strike and getting all they want, both now and in the future, there is to be an official paper issued every week, holding up the engineers in all their work, and, while edifying to themselves it will have a tendency to educate others relative to the duties, responsibilities and professional skill of the lake engineers as an organized body of expert artificers.

DETROIT.

Special Correspondence to The Marine Record.

Mr. McVittie can see no reason why the engineers' strike can't be settled forthwith, others say it is not the present demands of the association men that they squirm at so much as it is the future probabilities if concessions are made now.

Capt. Oliver Maisonville, who lived in Walkerville, Ont., died Monday at the age of eighty-one years. He was a sailor on the lakes for fifty-seven years, for many years being captain of the Grand Trunk car ferry Great Western. He was captain of the first railway transfer that crossed the Detroit river, as also of the first that crossed St. Clair river.

Mr. Norman B. Conger has taken charge of the Weather Bureau Office here again. Not sufficient for him to be inspector and marine agent, but he must also supervise the local forecast weather conditions. Well! Mr. Conger is a man of many parts; he is also a Michigander and holds the weather conditions in the hollow of his hand, so to speak. So now we may expect the same reliable old forecasts again After all, weather prognosticators are made, and by degrees, like the measures they measure with.

L. F. Hunt, of Saginaw, who was a member of the firm of Prescott & Hunt, and was also master of the steamer Rhoda Emily, which runs between Cleveland and Duluth, dropped dead on a Michigan Central passenger train a few miles north of Oxford, Mich., Tuesday. Mr. Hunt and the steamer's engineer, J. D. Budd, left Saginaw Tuesday morning and were on their way to Cleveland to take charge of the boat. Capt. Hunt had sailed the lakes for thirty years and was widely known. He was aged sixty-three years.

CHICAGO.

Special Correspondence to The Marine Record.

There are 25 million bushels of grain in elevators and afloat here this week, about half of which is wheat, upwards of 5 million bushels are already loaded.

W. E. Fitzgerald has given engineers on thirteen boats till Wednesday to return to work. He has non-union men to take their places, in the event of there being any demur.

The sailing yacht Illinois built by Lawley from designs by Crowninshield has had her preliminary trial and is a likely inter-lake champion for the Canada's cup. She will be shipped to this port from Boston on flat cars.

The Lake Michigan Carferry Transportation Co. have sent out formal announcement that their tugs S. M. Fischer and J. C. Ames would leave South Chicago April 15, towing two car ferries for Peshtigo. They will make four trips each week.

Owing to the increase of business of the Bethlehem Steel Co., South Bethlehem, Pa., at Chicago, the company will, on May 1st, move its offices in this city to larger quarters in rooms Nos. 1520 and 1521 Marquette Building, where they will continue to be represented by E. Nelson, sales agent.

A Chicago vessel owner is authority for the statement that the Graham & Morton Co., which has just purchased the Chicago-Holland line, will carry out the arrangement made last fall for the building of another passenger boat for the line, designed entirely for the day service and with a capacity of 2,000 passengers.

The new Chicago Trans-Atlantic steamship Northwestern will sail on her first trip from Chicago to Hamburg, Germany, on April 24. A cargo of agricultural implements and miscellaneous freight will be carried on the first trip. It is expected that the entire voyage down the lakes, through the St. Lawrence and across the Atlantic will take only 22 days. The boat and her sister ship will make regular trips to Hamburg after April 22.

Capt. John Tower, of the steamer Mary H. Boyce, visited New York City last week, and after an examination was granted an ocean license. Capt. Tower perfected himself at Clarence E. Long's Milwaukee nautical school, and the success which attended his examination serves as a high testimonial for the institution and its painstaking principal. The patronage of Mr. Long's school during the past winter exceeded his most sanguine expectations.

W. H. White & Co., of Boyne City, Mich., and Capt. Gustave Gunderson, of Sheboygan, have purchased from the John Spry Lumber Co., of Chicago, the steamer John Spry, which was formerly the Mary Durr. The Spry was built at Milwaukee in 1888, 583 tons A1½*, and is valued in the Inland Lloyds register at $30,000. The new owners will engage her largely in the hardwood lumber trade between Boyne City and Lake Erie ports. Her capacity for this material is 450,000 feet. Capt. Gunderson will have charge.

George Uhler, president of the Engineers' Benevolent Association, is flying around from port to port on the lakes as if he had to keep things in line with his men through personal contact. No doubt but that every one aboard of a boat earns every dollar they get in wages, but there is no use of one union whipsawing around trying to get the upper hand of others. There is another fight on now, between the lake cooks, who have joined the Bar Tenders and Waiter's Union, and the Seamen's Union. The cooks concluded the Seamen's Union was acting tyrannical toward them and so cut out the former affiliation.

The deal for the purchase of the Miller drydock property has been consummated. The sale has been made to New York capitalists and lake vessel owners. The corporation into whose hands the property has passed will be known as the Shipowners' Drydock Co. The purchasers have also secured some adjoining property. They will at once proceed to equip the yard with a modern plant for steel repairs and enlarge one of the docks to the length of 500 feet. W. W. Watterson has been appointed superintendent of the yard. Among the directors of the company are E. Mora Davidson, of August Belmont & Co., and G. L. Boissevain, of Kean, Van Cortlandt & Co., New York; M. A. Bradley and James Corrigan, of Cleveland, and C. A. Macdonald and J. J. Rardon, of Chicago.

The Menominee and Marinette vessel loaders' union have refused to sign an agreement proposed by the Lumber Carriers' Association to work for 45 cents per hour. At a recent conference at Menominee representatives of the longshoremen's union at the principal points on Lake Michigan discussed matters with the executive committee of the Lumber Carriers' Association, which was organized in Detroit, Jan. 17. The lumber carriers agreed that as freight rates were somewhat lower this year the wage scale should be equalized, not particularly to reduce it in any way. Representatives of the labor unions at Escanaba, Manistique, Gladstone, Masonville, Manistee, Green Bay and Cedar River were there, and on the advice of National President Daniel Keefe, agreed to work for 45 cents per hour. The Twin City unions were called into the conference, but refused to be governed by its action, and bolted. The unions will hold a meeting in April, when their wage rate will be determined. It is certain the rate will be 55 cents or more, should the advice of the radical element prevail over that of the more conservative.

BUFFALO.

Special Correspondence to the Marine Record.

The Northern Line re-appointed all of their former masters in the line, no action was taken regarding engineers.

The Lehigh Valley liner Mauch Chunk will be launched at Buffalo on Monday, April 15, from the yards of the American Ship Building Co. The Bedell excursion steamer was launched from the same yards last Monday.

There is no telling yet what the price of fuel will be this season. Ohio ports are fixed at $2.50, though it can't come down to that figure here. Last season $2.80 was maintained but there will likely be a reduction this year.

William H. Watterson, formerly of Lorain and later superintendent of the Buffalo yards of the American Ship Building Co., has resigned to accept a more lucrative position in Chicago with a new firm of drydock and ship repairers.

At a meeting of the adjusters representing the companies interested in the loss on the Buffalo Dry Dock Co.'s union drydock plant, held at the office of Smith & Wilcox, the loss was determined at $27,921.84. F. I. Crisfield, of the Liverpool & London and Globe Insurance Co., was chairman of the adjustment committee.

Plans were filed last Wednesday with the bureau of building at Buffalo for a new steel and concrete grain elevator, to be built on the eastern side of the Lake Shore & Michigan Southern railway tracks, just south of the junction of Abbott road and Elk street, for the Iron Elevator and Transfer Co. The structure will cost $100,000, will have a capacity of 750,000 bushels and will be modern in every respect.

Steamer Chili, came near wetting her wheat cargo before it was discharged a week or so ago. She was moored in the Erie basin, and during a spell of low water rested on a rock bottom, damaging several of her plates. When discovered her water bottom was about half full, but by quick work she was unloaded before the water reached the grain. Her cargo ran twenty-eight bushels over. She was at once drydocked for survey and final repairs.

It is quite likely that the Great Lakes Towing syndicate will swallow its only competitor, the Maytham Towing & Wrecking Co., in fact there has been considerable dickering from the small end of the horn already looking toward a sale of its boats, business, etc. It would be better all round though if there was good smart competition in the towing and wrecking lines. However, it is said that the deal is closed but no one will give out the exact terms or the money consideration.

Scores of owners had an idea that their engineers would stand by them under all circumstances, and this is true not of this port alone, they are now markedly undeceived on this point and it is right that they should be. The line managers never did anything for the engineers anyway, except pay them their wages, and even at that, some owners kicked at the high figures. A man from salt water is shaking them up pretty lively now and showing them how to treat lake engineers. I've not heard though that Geo. Uhler labored much on lake boats though that perhaps is a better reason why he is able to tell those who have what to do and how to act.

After holding a conference with President Uhler, of the Marine Engineers' Association, the Detroit unions issued a statements on Wednesday, in which they deny that the great object of the engineers is to disrupt the Lake Carriers' Association. They claim they simply want the members of the association to use their influence with the executive committee to have the demands of the engineers granted. They claim that if this is not done the owners must leave the association, as there is no use of the owners giving the engineers what they ask and at the same time attempt to live up to the classification of the carriers. Well! if this is not disruption, what is?

PORT HURON.

Special Correspondence to The Marine Record.

Capt. S. Ray is fitting out the schooner Hattie Wells for the season.

Capt. Charles Ludwick has gone to Cleveland to fit out the barge Anderson.

Capt. George Flood arrived in the city Wednesday from Chicago to begin work on the steamer Sanilac.

S. Neff, of Milwaukee, is in the city looking over the new boat building for him by the Jenks Ship Building Co.

A number of Port Huron engineers have left the city to fit out their boats, the owners having agreed to meet their demands.

James Jamieson and J. Cassin were at Algonac assisting Grand Purser Perkins in organizing a Harbor of the Masters and Pilots.

The steamer A. L. Hopkins, laid up at this port, has been sold to James McClarerty, of Detroit. He will command her this season.

I was up Lake Huron shore this A. M. and the ice is visiable as far as I could see, it will take lots of south wind and rain to use it up.

The canal size steamer Kennebee was launched from the Jenks Ship Building Co.'s yard yesterday, she is owned by Chesebrough Bros., Bay City.

Engineer A. Turner has left for Chicago to fit out the steamer Niagara. The owners have drawn out of the Lake Carriers' Association and have met the demands of the engineers.

The steamer T. D. Stimpson, owned by C. O. Duncan, was sold Tuesday to Capt. A. B. Slyfield. The boat will be used in the general lake trade and will tow two barges which Capt. Slyfield has lately purchased at Bay City.

In the $50,000 damage suit of the estate of the late Capt. Hackett, of the tug Torrent, against the Wilson Transit Co., the attorneys for the defendant upon the conclusion of plaintiff's proof, asked the court to direct a verdict for the defence on the grounds of contributory negligence and of failure to show negligence on the part of the defendant. Judge Thomas heard the argument and directed a verdict in favor of the defendants.

Capt. H. C. McCallum, representing the Detroit Sulphite Fibre Co., has chartered on private terms the steamer D. F. Rose and two consorts, owned by the Parker Transportation Co., of Marine City. The Fibre Co. has about 8,000 cords of pulp wood at Georgian Bay and Soo river points, and the boats will be used to carry it to Delray. It is reported that the Michigan Sulphite Fibre Co., of Port Huron, also has a deal on for some boats to be used in the pulp wood trade.

The interest created by the address of organizer Howard on the organization of a branch of International Seaman's Union at this port, had increased to such an extent that fully 500 union and non-union men were present at Odd Fellows' hall last Wednesday night. A sub-agency with headquarters at Toledo, was completed with a membership of 58. Mr. Howard was the first speaker of the evening. He said in part: The seamen's organization is 37 years old and its members have reason to feel proud of it, and before many years it will develop into one of the grandest union organizations in the country. One of the beneficial provisions in the laws is that a sailor in case of shipwreck will receive $30 from the union for material lost, and in case of the death of a member in good standing his widow will receive $75 as a benefit fund." Frank J. Webber, of the American Federation of Labor, was next introduced. He used the bible from beginning to end as an illustration that there had always been a union movement. He closed with predicting success to the marine engineers in their present struggle.

CLEVELAND.

Special Correspondence to The Marine Record.

Cleveland daily papers contain advertisements for lake engineers.

Harvey D. Goulder, Esq., has been chosen 1st vice president of the Chamber of Commerce.

Mr. Keneally, local forecast official of the Weather Bureau, has returned from his month's stay in Washington.

So the Great Lakes Towing & Wrecking Co. swallows the Maytham Line and thereby shuts off all competition. It had to go that way anyway.

A few engineers are being picked up regularly alone the line and sent aboard boats to fit out but the association men say that their ranks are still firm.

And now there is talk of a dredging syndicate to control the business on the lakes. Mr. Smith, of the firm of L. P. & J. A. Smith, is said to be a moving spirit in the $10,000,000 combination.

The United States Steel Corporation has chartered enough tonnage to carry all the Lake Superior iron ore required, at 50 cents per ton, to Lake Erie ports, free of unloading charges, which is 20 cents per ton.

After receiving extensive repairs during the winter at the yards of the Craig Ship Building Co., Toledo, the car-ferry Shenango No. 1 has commenced her regular trips again between Conneaut, O., and Port Stanley, Ont.

Cleveland has been doing herself proud this week in the matter of registering new tonnage. The Bureau of Navigation, Washington, D. C., has assigned official numbers to nine steamers having an aggregate tonnage of 29,404, or a mean of 3,267 tons, the gross tonnage ranging from 4,805 to 2,157.

The chief of the Naval Bureau of Construction, Admiral Bowles, announces that the cruiser Cleveland, U. S. N., is more than half completed, so that it is about time for the city to begin to get together subscriptions for that suitably inscribed silver service prominently adorned with the civic coat of arms, etc., to be presented to her namesake.

The principal owners of vessel property at this and other ports got together this week and formed an association of vessel owners with the object of maintaining fair living freight rates. Plans of the organization will be known at a later date. Messrs. M. A. Bradley, Robert Rhodes, John Mitchell and J. C. Gilchrist of this city and Edward L. Smith, of Buffalo, and C. W. Elphicke, of Chicago, were appointed a committee to formulate rules.

STATUS OF THE ENGINEERS' STRIKE.

At the annual meeting held in Cleveland last January, the Engineers' Association placed lake steamers in three classes and graded monthly wages accordingly; engineers were to be shipped with extra help, etc., only after withdrawing from the Association of Lake Carriers, and, as it was partly shown on a former occasion, that lake commerce could be rendered null in the heart of the season by a strike of the engineers, the foregoing demands were considered as good as granted, and the association of owners notified to that effect. Towards the end of March the following letter was sent to a number of engineers of large lines, after individual efforts to make terms had proved futile:

"Dear Sir:—You are hereby instructed by the manager to fit out the machinery on this company's boat, Monday, April 1. Your salary will be the same as last year if you start April 1. In the event of your failure to comply with this instruction on or about this date, this company will consider the position of chief engineer on this steamer vacant, and reserve the privilege of engaging another engineer for the position. Notify me at once at this office if you will be there."

It is needless to state that no engineers reported for work. On April 6th the following letter to Mr. George Uhler, president of the Marine Engineers' Beneficial Association was forwarded to Philadelphia:

"At its first regular meeting, the executive committee of the Lake Carriers' Association has taken up the subject of your communication of Jan. 26, 1901, and the proposals therein set forth as you were advised it would be, by the chairman, and beg to say that this committee cannot discuss the matters governing the management and administration of vessels controlled by members of the Lake Carriers Association, and must decline to take up the subject of your communication as suggested.

"We may say, however, that on the opening of navigation there will be no change in the wage scale adopted at the opening last year."

Last season's schedule of wages, framed by the owners' association, which was the highest paid in many years, is in a number of cases higher than the scale the engineers want put in force. The chief engineers on first-class steamers received $132 a month and the seconds $90. On steamers of the second class, first engineers were paid $114 per month and seconds $84. Engineers on third-class steamers received $96 a month and seconds $66. The wages are also maintained for all other ratings, from first mate down.

The United States Steel Corporation, owners of the largest fleet on the lakes, indicated its position in the marine engineers' strike this week by a clear-cut intimation to the Marine Engineers' Beneficial Association that it would not consider any demands upon the part of the engineers' union that its boats be taken out of the Lake Carriers' Association. If the employes of the Steel Corporation desire to take up any grievances they would be respectfully received and the grievances taken under consideration. The representative of the engineers' association to say whether the boats belonging to the Steel Trust should be enrolled in the Lake Carriers' Association or not, was flatly disclaimed. This now practically settles the issue between the vessel owners and the engineers. If the latter shall insist on not working for any member of the Lake Carriers simply because they belong to that organization, the strike will continue indefinitely.

It is said that President Uhler has decided to withdraw the boycott on vessels of the Lake Carriers' Association and let the men treat directly with the vessel owners. That being the case, most of the men will be at work without further loss of time, as there is little trouble between the employers and employes as to wages or the number of men on the boats.

The engineers at Buffalo are still sanguine as to the outcome of the strike, as they say that though the vesselmen are getting in outside engineers, they cannot find enough to fill all the places, and in the end they will have to call on the old engineers at the latter's prices.

Some members of the Lake Carriers' Association declare that in the future they will not give a bonus to the engineers and, as a result, the men will not receive pay for the winter months, which means a loss to them of nearly $250 a year.

According to a prominent Toledo member of the M. E. B. A., something radical will take place in a very short time in case the trouble existing between them and the Lake Carriers is not settled very soon. The men are becoming tired of being driven from pillar to post, and now want to know something definite before many days pass. Said the above-mentioned engineer: "The Lake Carriers are saying that they will fill the places of the strikers if they do not go to work when navigation opens. There are not many engineers they can get, as most of them are in the association and will not go on the boats. Our next move will be to ask for a 40 per cent. increase all around, and if that is not granted, the members will quit steamboating and look for other jobs. In fact, a number of them are doing so now. Outside of Toledo, Chicago and Duluth, there are no engineers who do not belong to the association, and we will get those in the three cities just as soon as we go after them, and when that is done, what will the vessel owners do for engineers?"

Putting the question in the light of the foregoing, the problem solves itself, for then there would be no lake Marine Engineers' Beneficial Association and Mr. Geo. Uhler president of the organization would need to turn his attention elsewhere.

THE SEA AND LAKE INSURANCE CO.

Secretary of State, William M. O. Dawson, of West Virginia, chartered the Sea & Lake Insurance Co. this week, with $500,000 capital. The incorporators are: Augustus B. Wolvin, of Duluth; Frank J. Hecker, of Detroit; James C. Wallace, of Cleveland; George L. McCurdy and Dennis Sullivan, of Chicago; Edward L. Smith, of Buffalo; Charles A. Eddy, of Bay City and William E. Fitzgerald, of Milwaukee.

At a meeting of the stockholders the following officers were elected: R. R. Rhodes, Cleveland, president; Col. F. J. Hecker, Detroit, first vice-president; Dennis Sullivan, Chicago, second vice-president; Col. G. A. Garretson, Cleveland, treasurer; Scott S. Daw, Chicago, secretary; George L. McCurdy, Chicago, underwriter. The directors are R. R. Rhodes, Col. F. J. Hecker, Dennis Sullivan, J. C. Gilchrist, Edward L. Smith, A. B. Wolvin, W. E. Fitzgerald, Charles A. Eddy, W. L. Brown. The main office of the company will be in Chicago.

POSITIONS IN THE LIGHT-HOUSE SERVICE.

LIGHT-HOUSE ESTABLISHMENT.
OFFICE OF THE LIGHT-HOUSE INSPECTOR, 9TH DISTRICT,
CHICAGO, ILL., April 8th, 1901.

Notice is hereby given that applications, on proper forms, will be received for thirty days from the date of this notice, at the office of the U. S. Light-House Inspector, room 1431 Marquette Building, Chicago, for the purpose of forming an eligible list from which to fill vacancies for master, mate, engineer and assistant engineer of vessels in the Light-House Service, which may occur in the Ninth Light-House District for one year from date of examination.

The Ninth Light-House District includes Lake Michigan, Green Bay, and tributary waters lying west of a line drawn across the Straits of Mackinac at Mackinac Point, Mich.

Persons who wish to apply for the examination for the foregoing positions should obtain the proper blank forms of application from this office, either in person or by mail, and after filling them out return them to this office. Applicants need not appear in person.

All applications received will be examined, the applicants graded according to merit, and a list of those eligible for appointment sent to the Light-House Board.

F. M. SYMONDS, Commander, U. S. Navy,
Inspector 9th L. H. District.
Chairman Local Civil Service Board.

SUBMARINE RIVERS.

A few months ago Mr. H. Benest, an English geographer, published an interesting study of streams of fresh water flowing beneath the surface of the sea.

Disasters to ocean telegraph cables first called attention to this subject. On several occasions, about 1895, a new and well-made cable between Cape Verde and Brazil broke. Soundings were made to discover whether these breakings were due to the state of the sea bottom, and it was found that the place in question was near the submarine mouth of a subterranean river. The alluvial material transported by this fresh-water stream encountered the cable and finally succeeded in breaking it. The fact is that a river that flows into the lagoons of Yof, on the coast of Senegal, is finally lost in the sand. It undoubtedly has taken its invisible course to the sea, and it is this river that has been discovered in the deep hollow of more than 1,300 meters, (4,270 feet) that is traversed by the Brazilian cable. Also, while the cable was being repaired at a point twenty-four kilometers (fifteen miles) from the shore the repair ship was surrounded one day by orange skins, calabashes and bits of cloth which could not have come from the mouth of the Senegal river, 140 kilometers (ninety miles) distant.—La Nature.

ANOTHER TYPE OF ICE CRUSHER.

Captain Inman, of Duluth, has steadily persevered in his plan to construct an ice-crushing steamer that will admit of all winter navigation between the Great Lakes, and now has sufficient financial backing from American and Canadian sources to make a fair start on the first boat. The general plan includes a stem and forefoot extending 25 feet ahead of the perpendicular, feeling its way under the ice and cutting and throwing it on either side like the nose of a snow-plow. The vessel will be constructed on entirely different lines from the ordinary freighter, and will have sufficient breadth at the forequarters to open a way for the remainder of the vessel, and so that the widest part of the hull will be abreast of the foremast, fish shaped. The propeller wheels will be so placed as to have no interference from the broken ice, and the whole hull will be designed with a view of reducing the friction to an extent that will bring the coal bills down to reasonable limits. The progress thus far indicates that something practical may be developed, and primarily to keep open the Gulf of St. Lawrence.

EASTERN FREIGHT REPORT.

Messrs. Funch, Edye & Co., New York, state the condition of the Eastern freight market as follows:

We are unable to report any improvement whatever in our freight market, which continues in a state of stagnation Grain business at the moment seems almost impracticable and we have only one fixture of this description to report on the basis of 2s 6d Cork f. o. Owners have turned their attention principally to chartering from the Gulf, from which direction better rates have been obtainable than from the North Atlantic ports. During the current week a further number of steamers have been closed for timber, but the rates accepted have, in most cases, been at reduced figures. There has also been some activity in long voyage trades for case oil, but shippers' requirements in this direction are now about satisfied. Time charters are still neglected and fixtures of this kind can only be effected at a decline.

In regard to sail tonnage, we have again to report a quiet market, without any great change. The only interesting feature is a charter of a vessel for a full cargo of case oil to the Colonies, the first of its kind, at 22 cents. A very large ship was fixed to Japan at 24 cents, which indicates rather a declining tendency.

TO ESTABLISH A DOMINION LLOYDS.

The Dominion government has granted a charter to E. V. and F. H. Clergue, F. S. Lewis and R. N. Douglas, of Philadelphia, to enable them and several Canadian capitalists to establish a Dominion Lloyds. The capital is $5,000,000. The high rates charged on freight and vessels on the St. Lawrence route has led to the government deciding to grant the charter. As repeated remonstrances with the British Lloyds had no effect, the government declared that every possible help would be given to the new concern. The attempt of the underwriters in Montreal and Toronto to defeat the application for the charter collapsed after this declaration.

UNITED STATES SHIPBUILDING.

MONTHLY AND QUARTERLY RETURNS, ALSO A SUMMARY FOR THE NINE MONTHS ENDED MARCH 30, 1901, COMPILED IN THE OFFICE OF THE COMMISSIONER OF NAVIGATION.

Vessels built in the United States and officially numbered during the nine months ended March 31, 1901, were 753 rigged, of 246,793 gross tons, indicating for the current fiscal year a probable total construction, including canal boats and other unrigged craft, of over 460,000 tons.

The increase for the first three quarters of this year over the corresponding period last year, has been 50,825 tons, of which 40,912 tons are credited to the Great Lakes.

Steel steam vessels numbered 56, of 128,369 tons compared with 59, of 102,322 tons for the corresponding period last year, the lake shipyards showing an increase of 33,500 tons, and the Atlantic seaboard a decrease of 13,000 tons. The decline, however, will be made good by the end of the fiscal year when several large steamers, recently launched, are numbered, including the Pacific Mail steamship Korea, not yet measured.

The principal factors of the new tonnage are 13 large lake steel steamers aggregating 59,860 tons, 19 large wooden schooners of 35,470 tons, and 5 large steel ocean steamers of 29,683 tons for the Hawaiian trade, three of which are also under contract to carry mails to Australia. Eleven large rigged barges of 16,594 tons have been built. For the first time the lake shipyards have built considerable steel steam tonnage for the seaboard, 7 steamers of 14,384 tons having thus far been built, which can pass through the Canadian canals. Four of these small steamers, when the ice permits, are designed for trade between lake ports and European ports. The remaining vesssels of over 1,000 tons are the New York and Cuba Mail steamship Morro Castle, 6,004 tons, 8 river, ferry and coasting steamers of 13,821 tons, 1 steel ship Astral, 3,292 tons, 2 barkentines, 2,461 tons, and 1 steam dredge of 2,525 tons. The smaller vessels, under 1,000 tons, number 685 of 62,779 tons.

MONTHLY SHIPBUILDING RETURNS.

TREASURY DEPARTMENT,
OFFICE OF THE COMMISSIONER OF NAVIGATION,
WASHINGTON, D. C., March 30, 1901.

The Bureau of Navigation reports 94 vessels of 44,230 gross tons were built in the United States and officially numbered during the month of March, 1901, as follows:

	WOOD				STEEL				TOTAL	
	Sail		Steam		Sail		Steam			
	No.	Gross	No.	Gross	No.	Gross	No.	Gross	No	Gross
Atlantic and Gulf	40	7,147	19	912	.....	.....	3	1,539	62	9,598
Pacific	4	774	10	293	.....	.....	.....	.....	14	1,067
Great Lakes	.....	.....	3	108	2	3,888	9	29,404	14	33,400
Western Rivers	1	37	3	128	.....	.....	.....	.....	4	165
Total	45	7,958	35	1,441	2	3,888	12	30,943	94	44,230

The largest steel steam vessels included in these figures are:

NAME.	GROSS TONS.	WHERE BUILT.	OWNER.
John J. Albright	4,805	Cleveland, Ohio.	American S. Bldg. Co.
Walter Scranton	4,803	" "	" " "
J. T. Hutchinson	3,734	" "	" " "
Neptune	3,717	Lorain, "	" " "
Saturn	3,717	" "	" " "
Northeastern	2,157	Chicago, Ill.	Northwestern S. S. Co.
Northman	2,157	" "	" " "
Northtown	2,157	" "	" " "
Northwestern	2,157	" "	" " "

The foregoing figures do not include craft without motive power of their own. From other sources than construction one vessel of 2,675 gross tons was added to the merchant fleet, being:

RIG.	NAME.	GROSS TONS.	WHY OFFICIALLY NUMB'D.
St. S.	Enterprise	2,675	Act Congress, Feb. 23, 1901.

THREE MONTHS' SHIPBUILDING RETURNS.

The Bureau of Navigation reports 185 sail and steam vessels of 67,744 gross tons built in the United States and officially numbered during the quarter ended March 31, 1901, as follows:

	WOOD				STEEL				TOTAL	
	Sail		Steam		Sail		Steam			
	No.	Gross	No.	Gross	No.	Gross	No.	Gross	No.	Gross
Atlantic and Gulf	81	14,578	37	1,714	1	1,120	6	3,568	125	20,980
Pacific	9	4,317	17	1,672	.....	.....	1	4,153	27	10,142
Great Lakes	.....	.....	6	1,969	2	3,888	9	29,404	17	35,261
Western Rivers	5	132	11	1,229	.....	.....	.....	.....	16	1,361
Total	95	19,027	71	6,584	3	5,008	16	37,125	185	67,744

The largest steel steam vessels included in these figures are:

NAME.	GROSS TONS.	WHERE BUILT.	OWNER.
Wilkesbarre	4,153	Buffalo, N. Y.	Erie R. R Co.
John J. Albright	4,805	Cleveland, Ohio.	American S. Bldg. Co.
Walter Scranton	4,803	" "	" " "
J. T. Hutchinson	3,734	" "	" " "
Neptune	3,717	Lorain, "	" " "
Saturn	3,717	" "	" " "

During the corresponding quarter ended March 31, 1900, 205 sail and steam vessels of 62,661 gross tons were built in the United States and officially numbered, as follows:

	WOOD				STEEL				TOTAL	
	Sail		Steam		Sail		Steam			
	No.	Gross	No.	Gross	No.	Gross	No.	Gross	No.	Gross
Atlantic and Gulf	93	15,111	39	2,990	2	2,774	15	21,011	149	41,886
Pacific	12	5,718	12	2,198	.....	.....	1	1,063	25	8,979
Great Lakes	.....	.....	4	775	.....	.....	2	9,399	6	10,174
Western Rivers	4	126	21	1,496	.....	.....	.....	.....	25	1,622
Total	109	20,955	76	7,459	2	2,774	18	31,473	205	62,661

NINE MONTHS' SHIPBUILDING RETURNS.

The Bureau of Navigation reports 753 sail and steam vessels of 246,973 gross tons built in the United States and officially numbered during the nine months ended March 31, 1901, as follows:

	WOOD				STEEL				TOTAL	
	Sail		Steam		Sail		Steam			
	No.	Gross	No.	Gross	No.	Gross	No.	Gross	No.	Gross
Atlantic and Gulf	328	58,754	123	7,566	7	10,012	26	47,747	484	124,079
Pacific	55	18,296	44	7,196	.....	.....	4	6,030	83	31,522
Great Lakes	5	108	30	2,551	3	6,678	25	74,030	63	83,367
Western Rivers	46	847	76	6,596	.....	.....	1	562	123	8,005
Total	414	78,005	273	23,909	10	16,690	56	128,369	753	246,973

During the corresponding nine months ended March 31, 1900, 732 sail and steam vessels of 196,148 gross tons were built in the United States and officially numbered, as follows:

	WOOD				STEEL				TOTAL	
	Sail		Steam		Sail		Steam			
	No.	Gross	No.	Gross	No.	Gross	No.	Gross	No.	Gross
Atlantic and Gulf	365	49,704	109	7,696	8	9,760	47	60,680	529	127,840
Pacific	34	13,185	40	5,406	.....	.....	1	1,063	75	19,654
Great Lakes	6	58	24	1,868	.....	.....	10	40,529	40	44,455
Western Rivers	15	391	72	5,758	.....	.....	1	50	88	6,199
Total	420	63,338	245	20,728	8	9,760	59	102,322	732	196,148

THE LAW OF MAGNETISM.

A SHORT AND CONCISE LESSON ON MAGNETISM AS IT AFFECTS THE MARINER'S COMPASS.

BY CLARENCE E. LONG, MILWAUKEE.

(Arranged for Masters and Pilots on the Great Lakes.)

CHAPTER I.

An exhaustive inquiry into this most important subject must involve a whole book on it alone, whilst in these pages we can but afford it a few chapters. The object of these notes is to make known a plain and simple method of determining its effect on the magnetic needle. It is also intended to show that a practical knowledge of the Law of Magnetism can be easily acquired by any master or pilot, and thence the theory of the deviation of the compass and compass adjustment, or still better, compass compensation. It is absolutely necessary to have an understanding of the principal features of the theory since it is certain that anyone who attempts compass adjustment by mere "rule of thumb" without first clearly comprehending the laws upon which it is based, can never hope to perform it satisfactorily.

MAGNETISM.—Magnetism is that branch of physical science which treats of the nature and properties of magnets and of their action on each other. The term magnetism is also used to designate the force which produces the effects called magnetic. Magnetism is an invisible fluid without sensible weight, and so very subtle that it pervades all bodies capable of being magnetized.

The term magnet was given by the ancients to certain black stones found in various parts of the world, notably at Magnesia in Asia Minor, which possessed the property of attracting small pieces of iron and steel. This magic property as they deemed it, made the magnet stone famous; but it was not until the Tenth or Twelfth Century that such stones were discovered to have the still more remarkable property of pointing north and south when hung up by a thread. This property was turned to advantage in navigation. Its various names are interesting. In Pliny's time it was called ferrum vivum (quick iron); the Chinese knew it as tchu-chy (the directing stone); and similarly in Swedish it is seqel-sten (the seeing stone); in Icelandic, liederstein (the leading stone), and in English the loadstone (from Sax., to lead).

POLES AND NEUTRAL LINE, OR EQUATOR OF THE MAGNET.

Every magnet, whether natural or artificial, has two poles and a neutral line. The poles, called North and South poles, are at the extremities of the magnet and these portions are where the magnetic attraction is the greatest, and the neutral line or equator of the magnet will be about the center of the magnet. This is also called the dividing line, which separates the north and south polarity, or magnetism, from each other. At the middle portion of the magnet there is no magnetic force, hence its name—neutral point.

The natural magnet, called loadstone, is exceedingly rare, although closely related to ore of iron, is of a dark gray color, and is found in Sweden, Norway, Spain, Arkansas and the Isle of Elba.

What is known as an artificial magnet, is when a piece of steel, which has been properly hardened and tempered, is rubbed with a piece of loadstone, or by another magnet, or when a current of electricity is passed around it by means of a coil of insulated wire, it becomes a more or less powerful magnet. Artificial magnets are permanent or temporary as they retain their magnetism after being removed from the source by which they acquire it. The needles or bars of steel in the mariner's compass are artificial magnets. Artificial magnets have identically the same properties of the natural magnet—two poles and a neutral line.

The property of attracting iron is very unequally manifested at different points of the surface of the magnet. If, for example, an ordinary bar-magnet be plunged in iron filings, these become arranged around the ends of the bar in feathery tufts which decrease towards the middle, which is bare. If the magnet is very thick in proportion to its length, we may have filings adhering to all parts of it, but the quantity diminishes rapidly towards the middle. The middle portion, where there is no visible magnetic force, and to which the filings refuse to adhere, is the line of no magnetic force.

MAGNETIC NEEDLE.—Any magnet freely suspended near its center of gravity is usually called a magnetic needle. One of its most usual forms is that of a very elongated rhumbus of thin steel, having very near its center a concavity or cup, by means of which it can be balanced on a pivot. When it is thus balanced horizontally it does not, like an ordinary piece of matter, remain in equilibrium in all azimuths, but assumes one particular direction, to which it always comes back after displacement. In this position of equilibrium one of its ends points to magnetic north and the other to magnetic south, which differ in general by several degrees from geographical, or true, north or south. This is the principle on which compasses are constructed.

MUTUAL ACTION OF POLES.—The two poles of a magnet appear identical when they are brought in contact with iron filings, but this identity is only apparent. On presenting one end of a magnet to one end of a needle thus balanced, we obtain either repulsion or attraction, according as the pole which is presented is similar or dissimilar to that to which it is presented. For when a small magnetic needle is suspended by a fine thread, and the north pole of another needle is brought near its north pole, a repulsion takes place. If on the contrary, the north pole is brought near the south pole of a movable needle, the latter is strongly attracted. Hence, these two poles are not identical, for one is repelled and the other attracted by the same pole of the magnet. It may be shown in the same manner, that the two poles of the latter are also different by successively presenting them to the pole (north) of the movable needle. In one case there is repulsion, in the other attraction. Hence the first general law in magnetism is, that unlike poles attract one another and like poles repel one another; or, poles of contrary name attract and poles of the same name repel.

MAGNETIC FORCE.—The force with which a magnet attracts or repels another magnet, or any piece of iron or steel, is called magnetic force. The force exerted by a magnet upon a piece of iron or another magnet is not the same at all distances, the force being greater when the magnet is nearer, and less when the magnet is farther off. In fact, the attraction due to a magnet pole falls off inversely as the square of the distance from the pole.

Whenever a force acts thus between two bodies, it acts on both of them, tending to move both. A magnet will attract a piece of iron, and a piece of iron will attract a magnet. This may be shown by fixing a magnet upon a piece of cork and floating it on a basin of water; it will be found to move across the basin when a piece of iron is held near. A compass needle thus floated turns round and points north; but it does not rush towards the north as a whole, nor towards the south. A piece of loadstone, or natural magnet, fixed upon a piece of cork and floated in a basin of water, represented Columbus' compass equipment on his trip across the trackless ocean.

ATTRACTION ACROSS BODIES.—Magnetic attraction and repulsion are exerted without modification through any body which may be interposed, provided it be not magnetic. Thus, a small cylinder of soft iron is readily attracted by a magnet through a plate of glass or piece of wood; and similarly, of course, the magnetic needle may be attracted. A magnet sealed up in a glass tube still acts as a magnet. A magnet put in a brass vase has been found to attract iron filings through the brass. Across water, vacuum, and all known substances, the magnetic forces will act, with the single exception, however, that magnetic force will not act across a screen of iron or other magnetic material. If a small magnet is suspended inside a small hollow ball made of iron, no outside magnet will affect it. A hollow shell of iron will, therefore, act as a magnetic case and screen the space inside it from magnetic influence.

MAGNETIC INDUCTION.—When a piece of soft iron is in contact with a magnet, or even when a magnet is simply brought near it, it becomes itself, for the time, a magnet with two poles and a neutral portion between them. Thus if the north pole of a magnet be brought near to the end of a small bar of iron, that end becomes a south pole, while the remote end of the bar becomes a north pole. The opposite effect will take place when the south pole of the magnet is presented, and, in general, the magnetism induced in the bar is such that a contrary pole is developed at the end next the inducing pole of the magnet, and a similar pole at the remote end. These facts may be shown by means of a compass needle. The end of the bar remote from the acting pole attracts one of the poles of the needle and repels the other in a manner precisely similar to the acting pole itself. The magnetism developed in the end of the bar next the acting pole is not so easily manifested, for the magnetic needle placed near that end will be acted on directly by the pole of the magnet itself, as well as by the induced pole of the iron bar, and the result will be complicated by the joint action.

The iron bar, thus rendered magnetic, exhibits all the other properties of a magnet. It attracts iron, the attractive force increasing from the center to the two poles. If we scatter filings over the iron they will adhere to its ends, as in the case of the original magnet, the effect being only complicated by the action of the inducing pole. If we take away the influencing magnet the filings will fall off, and the iron will retain no traces at all, or only very faint ones, of its magnetization.

But if the magnet is turned end for end, and the position of the poles changed, then the marked end (N. or red pole) of the magnet, will instantly induce in the ends of the soft iron poles of a character opposite to those they previously had, which may be easily tested by holding a suspended magnetic needle to the outermost ends of the soft iron, and the experiment is an illustration of the effect of transient induced magnetism.

Again, if we lay two magnets in a line at a short distance, with unlike poles turned to one another, and place a thin bar of soft iron between them, the latter becomes a temporary magnet while so situated; for the end next the red pole of the magnet will become a S. pole, and the end next the blue pole of the other magnet will become a N. pole. The iron bar has now become a magnet by induction.

But the effect is only temporary, for if we turn the iron bar gradually about its center, it will as gradually lose the magnetism acquired by induction; when it is at right angles to the two magnets it will be in a neutral condition, and if turned further it will become magnetized in the opposite way.

(TO BE CONTINUED.)

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CLEVELAND, O., APRIL 11, 1901.

PSHAW! We get nothing out of that City of Rio de Janeiro court of inquiry anyhow.

THE late Lieut. Commander Roper, U. S. N., was a sailor, he was also a fire fighter and above all a humanitarian.

NOW let's have a codification of the rules of the United States Board of Supervising Inspectors of Steam Vessels.

EVIDENTLY there are not enough engineers in the lake service to go around, so that the market is temporarily cornered.

AND now expert statisticians are figuring that the Lake Superior iron ore supply will begin to be dwindling about three or four decades hence.

THE principal lake ports, except Cleveland, are taking great interest in the Canada's cup race. What's the matter with the yachtsmen of the Forest City?

TALK about lake-built cargo steamers having their engines well aft. The funnel or smokestack pointing over the taff-rail has been the house flag of colliers for several decades past.

THE millions of tons of cargo carrying capacity controlled by the steel syndicate will be expected and required to meet all disbursements, so also can tonnage owned by minor interests.

HARBORS of refuge on the Great Lakes is a mollifying mouthful in Congress, but it don't roll around so salubrious to the poor bewildered son of a sea cook horsed down on a lee shore.

THERE are pilotas enough, so far as piloting is concerned, to pilot everything afloat on the lakes, but even Supervising Inspector-General Dumont and his staff of supervising and local inspectors can't pilot engineers to the starting lever.

IT will weary the soles (souls) of the steamboat inspectors running after those northern named Chicago-Hamburg-Liverpool and Manchester tramps to find out whether they are duly piloted and engineered on each cruise between salt and fresh water, also vice versa.

IN reply to a letter of inquiry the Supervising Inspector General of the Steamboat Inspection Service says: "I do not agree with your opinion, that an accident occurring to a steamer with a second-class pilot in charge would prima facie be 'held in fault by the courts.' "

INQUIRY INTO THE LOSS OF THE RIO JANEIRO.

After going over the findings of the court of inquiry, held in San Francisco by the U. S. local inspectors of hulls and boilers, into the loss of the steamer City of Rio de Janeiro, we confess to a feeling of inadequacy relative to the manner and scope of their investigation.

The decision places the responsibility for the loss on the master and pilot, the chief engineer being also blamed and his license cancelled. This, apparently, is all that we learn from the loss off the entrance to San Francisco of 127 lives and $900,000 worth of property, on February 22d last.

Throughout the inquiry there seemed to be an undue attempt to make a scapegoat of someone, the master being lost and the pilot coming under the State jurisdiction, attention was turned solely to the chief engineer, who was most severely handled, resulting in the loss of his license after 28 years' successful service in the employ of the Pacific Mail Steamship Co., late owners of the sunken vessel, although it was not shown that anything had gone wrong in the engine room, but that, on the contrary, all had been done that was possible before and after the vessel struck.

Instead of this insistence of search after personal defects, we would rather have seen the inquiry pursued on a wider technical basis, so that some recommendations might have been made for the future guidance of other vessels under similar circumstances. For instance: First, what was the exact state of the weather when the vessel got under way, tide and current, and what engine room and steering signals were given? Second, when were the compasses last adjusted and in what direction was the steamer heading, also the rate of speed before she struck, was the course and, or, speed changed, how often and in what direction? Third, demonstrate clearly that from the actual course and distance made good how far the steamer was from her supposed position at the time of her foundering. Fourth, was a reliable and competent lookout kept from the moment of leaving her last anchorage, and what reports were made, if any, by whom, and at what times? Fifth, what sounds were heard from the shore, and if any, could they be clearly distinguished, was the lead ready for use or being used and were the engine room and steering signals promptly obeyed, what was the state of the weather, course and speed when the vessel struck? Sixth, how often had life-boat drill taken place, were the boats and life-rafts in condition for immediate handling and life-belts conveniently placed, was good order and discipline maintained after the vessel struck, or the reverse, could any further measures have been taken to save life, and to what must be ascribed the loss of 127 lives out of a total of 205 persons, etc., etc.

The foregoing is in brief the line of inquiry which would probably have resulted in furnishing some useful information and guidance at a time when under similar weather conditions it might be found compulsory, through collision, fire or other damage, to attempt to get a vessel inside the Golden Gate.

The paltry question of whether there was a difference of 10 to 15 pounds of steam in the boilers, as long as she had a good head on of 145 pounds, seems rather immaterial, so also does the matter of the chief engineer being completely dressed or otherwise. Of course, he ought to have used his engine force in getting a boat or boats over the side, yet, on being compelled to desert his post and station he awaited further orders, and the foregoing seems to have been the only or chief points inquired into by the local inspectors. As a matter of fact and evidence, the chief engineer appears to have had no blameable influence in the sinking of the vessel, and but a scant four minutes to collect his thoughts from the time that he was driven from the engine room until she foundered. Fortunately, vessels are not lost on every trip, and it is not to be expected that those unused to the strict deck discipline of a well-kept ship should get slightly flustered when, once in a lifetime, they find the tank going from under their feet. It is to be hoped that such representations will be made to the Supervising Inspector of steamers for the district that will permit of him granting temporarily to the chief engineer, Mr. Herlihy, a lower grade of license, subject to his full re-instatement at a later date, should he be compelled to again attempt the fate of solitary confinement, with the privilege of being drowned.

WE perceive that it will be necessary to keep everlastingly at it if the adequate buoyage and lighting of the River and Gulf of St. Lawrence is to be consummated before Gabriel blows his horn to announce the departure of good American seamen for Davy Jones' locker.

A PROBLEMATICAL QUANDARY.

It may have appeared to many readers of the MARINE RECORD that we have from time to time given undue space and attention to the rulings of the Steamboat Inspection Service, the action of the Board of Supervising Inspectors and the mandates of the Supervising Inspector-General, who is usually credited with being "the man behind the gun" when any problematical quandary comes to the front.

Those who have not been brought closely in contact with the service are always agreeably quiescent to the arbitrary judgment and ruling of the local inspector, and follow his rendition of the law without questioning, even although they oceasionally run butt against contradictory opinions as between the officers of the several lake districts. Others, who may partake slightly of the disposition of a doubting Thomas, are shown the printed rule in question in its original form, with an amendment attached thereto, and on a further search of the "Key to the Rules," it is frequently found that the clause has been amended in an unintelligible degree or in such a manner that the local inspector must, perforce, form his own opinion, and in doing so, convince his interlocutor that he is about right.

In view of the foregoing, it is not to be wondered at, when the divergence of opinion is such as to cause a widespread feeling of ignorance, unrest and mental uneasiness regarding the literal intent of rules in their amended amendments to the multiplicity of cancelled clauses to the U. S. Revised Statutes. With a supervising inspector located at Cleveland and another at Detroit, each in close touch with the general inspector at Washington, one would think that the score or so of local inspectors ought to be kept keyed up to a unanimity of official rulings, routine duty, and clerkly discipline, yet such has not been the case in the past, nor does it exist at the present, hence, the uneasiness experienced when local inspectors are left in a great measure to determine ambiguous rulings or the phraseology contained in so many of the clauses which guide (?) them in their official duties. Their requests for enlightenment are usually unsatisfactory, nor can they make nuisances of themselves by exhibiting an apparent denseness of the superior comprehension in language and technique of their superiors in office.

In the midst of frequently recurring inconsistencies throughout the service, the RECORD is not at all surprised at one of the latest, wherein a most eminent authority and experienced lake shipmaster labored under the delusion that a duly licensed second mate was not authorized to take charge of the deck, and acting under this belief, has for the past decade and upwards, debarred all second mates from keeping watch on the several lines of steamers of which he was and is manager, so that in this instance alone, the confusion of wording in the steamboat inspection service rules, has worked irreparable injury to many bright young men climbing their way up the ladder of labor advancement, not that the liberal minded and experienced ships-husband desired to employ only those having the highest qualifications, but that he thought, and always understood that such a requirement was mandatory, legally compulsory, and by no means optional. This Cleveland steamboat manager has no doubt consulted many local inspectors during his three score years of lake experience, before his recent communication to the Inspector-General he doubtless consulted the locals and supervising inspector at his home port, but, as the law was differently construed in their neighbors' district, mum was the word, and a Washington correspondence ensued, from which it has been determined that the head of the service differs with the best credited pilot on the lakes, chairman of the committee on aids to navigation of the Lake Carriers' Association, and a steamboat manager, also a shipmaster of the highest repute, as well does the chief run counter to the ordinary practice of many of his own subordinates in the lake service.

It is now assured that a second-class pilot can keep the starboard watch, if his license is endorsed, he being simply kept in that grade to gain judgment and discretion before being re-examined for first-class papers, and given a master's license, which, as servitude is the only qualification, must, perforce, be granted to him on his renewed application therefor. So the Grand Haven custom under the immediate jurisdiction of Supervising Inspector Westcott settles the status of the assistant to the first class pilot holding only a second-class pilot's license. Briefly, first and second-class pilots on the lakes stand in the same relation as the first and second mate on the coast, if the second-class pilot's license is so endorsed, but where the master comes in we

don't know yet, or what are the qualification for such a grade superior to that of the first-class pilot or first mate, if any.

It appears that the Supervising Inspector-General of the Steamboat Inspection Service wriggles himself out of the above situation in his usual diplomatic style, nor will he ever be found jumbled up in a clinch while he has the two ends and the bight of tangle-foot framed rules to veer and haul upon.

Finally, it is still a problematical quandary whether a second-class pilot can take charge of the deck or not, the size of the deck and the views of the various district inspectors counts considerably in the ocriss-cross ink indorsement on a printed license form.

CANADIAN MARINE INSURANCE.

Hitherto it has been almost impossible to obtain inclusive figures regarding the volume of Canadian marine insurance in connection with the trade and commerce of the Gulf of St. Lawrence. The underwriters at Toronto, Montreal and Quebec held their whist and were not giving the inside track of their business away by any means and in this they appeared to be ably seconded by the English Lloyds and other foreign companies.

An eminent Canadian, Mr. Dobell, recently complained in the Dominion Parliament that the losses on hulls and cargoes in the St. Lawrence trade were not ascertainable, and therefore but few authentic statistics could be quoted. In this connection Mr. Dobell has done a lot of pioneer work both in England and Canada but it looks as if the seed fell on stony ground in the first named territory, as the North American trade has a bad name anyway and sounds bitter to the Britishers, as well it might, for they have had to pay the piper for lo, these many years, as anything and everything north of Boston, Mass., danced to the tune of losses in the North American trade and the risks were followed across the Atlantic even to the British Isles or other destination and labeled N. American—all of which was and is very unfair to the Gulf and River trade proper.

With the advent of Mr. Dobell's energetic and irrepressible measures for a modicum of justice in the matter of shoveling out premiums to marine underwriters, along came the immense interests of Mr. Clergue of Sault Ste. Marie fame, and the consequent formation of a brand new insurance company known as the Canadian Lloyds, with a capital of $5,000,000, backed under the most favorable auspices of the Dominion government, and so supported as to bring the Marine Underwriters' Association of Canada out of their shell, so to speak, inasmuch as a certain array of figures, bunching up a series of eleven years' business has been set before the marine interests for the special edification of ship owners, charterers, shippers and consignees, and all with a showing of how terribly unfavorable the navigation of the St. Lawrence River and Gulf is to the established marine insurance companies, and to warn off intending capital from participating in such a grievious run of ill luck, which they themselves had been forced into experiencing through their unbounded patriotism and charitably disposed acceptance of apparently extortionate premiums, but which really meant shouldering abnormal risks, with a doubly positive certainty of annually recurring losses on the individual and aggregate obligations entered into.

It appears from the statistical report recently compiled by the Marine Underwriters' Association of Canada, that the total exports by steamer from Montreal from 1889 to 1899, inclusive, were $411,813,749. At the rates charged by Montreal agencies during that period, the total premiums upon this sum would amount to $1,598,711. Allowing 20 per cent. ($319,732) for the expenses of conducting business, there remains $1,278,969 to pay losses during the same period, which are shown to have amounted to $2,921,609, leaving, in round figures, a net loss to the underwriters of $1,600,000, the premiums and losses taken into account for exports only, the rate charged upon the Montreal outward business being those which have been chiefly criticized. It may be stated, however, that losses on inward cargoes since 1899 amount to some $1,500,000, while the losses on hulls, inward and outward (steamers only), are estimated at over six million dollars. These together show total recorded losses of over $10,000,000 by the St. Lawrence route during a period of 11 years. The losses are divided as follows:

Export—Hulls, $3,463,427, and cargo, $3,057,609.

Imports—Hulls, $2,569,794, and cargo, $1,526,745, or a grand total of $10,618,575.

Divided in losses incurred in the St. Lawrence River and and Gulf, and losses incurred outside the river and gulf, the figures are: St. Lawrence River and Gulf—Hulls, $4,423,221 and cargo, $3,317,404; outside the gulf—hulls, $1,610,000, and cargo, $1,267,950.

The eleven years' figures are charming in their frankness and can be taken "cum grano salis" considering their source. We have always held that the North American trade was the most risky in the world under the sailing ship era; furthermore, and principally so, from the class of tonnage relegated to that route, for, when unfit for carrying other cargoes, they could be labeled timber droguers and all the troubles that they got into, for they couldn't keep out of them, was another black eye to the credit or discredit of the North American trade. This era has nearly passed away; the stigma attached to the St. Lawrence trade should be wiped out, and, in spite of the eleven years' combination of statistics of marine losses, or rather because of such, let the people of the Province of Ontario and incidentally the positively vast increasing interests on this side of the national border be given a straight deal and an adequate show-down in this age of steam.

SECTION 6 of rule 5, general rules of the United States Board of Surpervising Inspectors of Steam Vessels, says: "The navigation of every steamer above 100 tons burden shall be under the control of a first-class pilot, and every such pilot shall be limited in his license to the particular service to which he is adapted." Then we have section 7 of the same rule 5, as follows: "Second-class pilots may be allowed to take charge of steamers not exceeding 100 tons burden, and may be authorized by the license granted to act in charge of a watch as assistant to a first-class pilot on passenger, freight and towing steamers of all tonnage. Clear, lucid and self explanatory, isn't it? The old man must have thought he was in the Hooghly river making first-class assistant leadsmen to a full branch mud pilot. That second-class pilot can take charge of a steamer, a watch, or act as assistant. Well! the 2nd dickey or "greaser" always was in for it anyway.

WE last week concluded a series of articles on the management of open rowboats in a surf, beaching them, etc., reproduced from instructions published by the Royal National Life-Boat Institution of Great Britain. However, the British Isles being so mighty small in extent there is a great similarity in the contour of the coast line and these rules will not apply in all cases to the coasts of the United States. It is possible for the chief officer of our Life-Saving Service to communicate with the national officers in charge of similar departments throughout Europe, Asia, Africa and Australasia so as to learn their best custom and practice. We are aware that the Consular Department is about loaded down with all sorts of requests from and including industrial statistics down to who struck Billy Paterson in the wilds of Timbuctoo. So that a heart to heart talk with the renowned life-savers of all nations would be of more avail to our chief mogul.

OF course, all aids are acceptable, and it is now proposed to keep channels and fairways open in thick, foggy weather by a system of port and starboard bells operated from the shore and connected with the vessel by the wireless telegraphic system. Threading your way into New York harbor, through the Golden Gate, Boston Narrows, Rivers Thames or Mersey in an impenetrable fog, by the aid of this submarine pilot and messenger is a charming futurity, but does it eliminate all possibility of human errors or scientific eccentricities and mechanical breakdowns? Let's first get into consultation with and court the good graces of Mars before requesting Jack to go it blind on a fractional inch of metal.

A DECISION in a collision case involving upwards of $30,000 has just been ruled upon in Buffalo for a breach of the sailing rules in St. Mary's river. Certain interests worked along until special rules are also to be enforced in the Detroit and St. Clair rivers, outside of which the "White Law" steering and sailing rules are to be observed. Canadians have not been asked to endorse these rules for international channels and it looks as if we are liable to let laws run riot on this side of the line.

AS aids to navigation, flash, occulting or intermittent lights are preferable to fixed ones.

WE are getting along nicely now in so far as Federal laws, rules and regulations are concerned, and there are still a round dozen or so more that we can have for the asking. To enumerate, laws governing the movement and mooring of vessels in the outer harbors, rules and regulations for the speed, steering and movement of vessels in the rivers Detroit, St. Clair and St. Mary, the so-called "White law" for the lakes between Duluth and Montreal, and the international "Rules of the Road" outside of the foregoing limits. As we have said, p'raps a few more are also eminently desirable, if not absolutely necessary, for the better bewilderment of the flat-foot and as being conducive to the safe and prompt piloting of a boat from behind a desk.

So, a man holding a second-class pilot's license was to be considered a loblolly boy for a 1st class pilot and unfit to take charge of a watch. Pretty encouragement this for a candidate to stand a voluntary examination to prove his superior qualifications over those of a common, ordinary fresh water laborer, or impostor. If the 2nd class examination is not sensible enough better make it so. What use has a 1st class lake pilot for a No. 2 self anyway, if he wants a second pair of eyes let him use artificial instead of natural ones. The days of sea nurses, live belaying pins, bunt reefers and yard arm furlers are past. Let the man do what he ships for and be all there in doing it, too.

THE local inspectors of steamboats at San Francisco tried to make a deck officer out of the chief engineer of the Rio Janiero and because he demurred they cancelled his license, he had held it and served in the same employ for nearly 30 years, only to be found baselessly incompetent. Now let the late owners of the Rio enter action against the licensing board for qualifying a numbskull and endangering their property.

CAPT. INMAN, of Duluth, appears to have a supreme contempt for the "Ice King". If he pilots one of his contemplated ice ram crushers to the westward on Lake Superior in a January blizzard the cynical ha-ha may be turned to venerated respectfulness. The log books of the Straits of Mackinac ice crushers ought to show something about leap-frog tactics with winrows and hummocks of the purifying coolness.

LET'S see, how are marine engineers on life-boat drill? The 'Frisco local inspectors of steamboats scored the chief of the Rio Janeiro for not acting coxswain, or, and, in the first place, boatswain. Well, he can be any old swain now, for they have captured his bread and butter, and he will find out, but then he knows, that old standing rigging makes poor running gear.

NEW LAKE BUILT TONNAGE

Official numbers were assigned to the following steamers by the Bureau of Navigation during the week ended March 30, 1901:

NAME	TONNAGE		WHERE BUILT	HOME PORT
	Gross	Net		
J. T. Hutchinson..	3,734	2,780	Cleveland	Cleveland
John J. Albright..	4,805	3,298	Cleveland	Cleveland
Neptune.....	3,717	2,773	Lorain, O.	Cleveland
Northeastern.....	2,157	1,496	Chicago	Cleveland
Northman	2,157	1,496	Chicago	Cleveland
Northtown	2,157	1,496	Chicago	Cleveland
Northwestern.....	2,157	1,496	Chicago	Cleveland
Saturn	3,717	2,772	Lorain, O.	Cleveland
Walter Scranton..	4,803	3,294	Cleveland	Cleveland

The foregoing shows a total of 29,404 gross tons, or a mean tonnage for the nine steamers of 3,267, all hailing from Cleveland. The boats with the northern cognomen are for the interlake and Atlantic trade, and their signal letters are respectively, "K.G.R.G.," "H.," "J.," and "L." The other boats are intended solely for the lake trade and no signal letters are issued to them.

Since making up the foregoing table we have received the official numbers of four other new lake built steamers, as follows: Argo, 1,089 gross and 740 net tons; also the Meteor, 2,301 gross and 1,565 net tons, both built at the yards of the Craig Ship Building Co., and hailing from Toledo, O., and showing a gross measurement tonnage of 3,390. The David M. Whitney, 4,626 gross and 3,584 net tons, built at Wyandotte, Mich., and hailing from Detroit. The Venus, 3,719 gross and 2,766 net tons, built at Lorain, O., and hailing from Cleveland.

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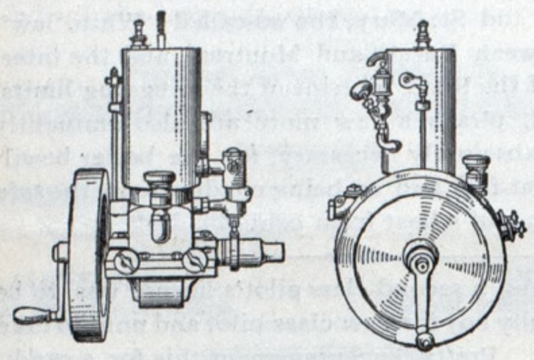

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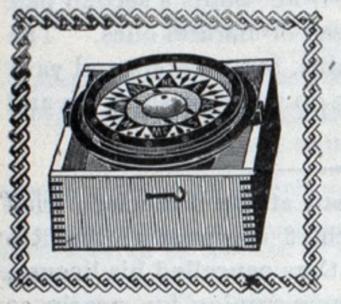

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NOTICE TO MARINERS.

LIGHT-HOUSE ESTABLISHMENT,
OFFICE OF THE LIGHT-HOUSE INSPECTOR,
TENTH DISTRICT, BUFFALO, N. Y., April 4th, 1901.

DETROIT RIVER.—BAR POINT SHOAL LIGHT LIGHT-VESSEL NO. 59.

Notice is hereby given that the boiler of Bar Point Shoal Light-Vessel No. 59, has been disabled, and that when the vessel is placed on her station and until further notice, the fog-bell will be used in place of the steam whistle, in the following characteristic manner, viz:

Rung continuously by hand for 10 seconds with silent intervals of 30 seconds.

A. DUNLAP, Commander, U. S. N.
Inspector 10th Light-House District.

UNITED STATES OF AMERICA—NORTHERN LAKES AND RIVERS—MICHIGAN.

TREASURY DEPARTMENT,
OFFICE OF THE LIGHT-HOUSE BOARD,
WASHINGTON, D. C., April 3, 1901.

LAKE SUPERIOR.

POINT ABBAYE SHOAL.—Notice is hereby given that Point Abbaye Shoal (N.) bell buoy, black, and Point Abbaye Shoal (S.E.) buoy, a red, third-class can, which marked the northerly and southeasterly ends, respectively, of the shoal off Point Abbaye, Lake Superior, will be replaced as soon as practicable, but probably not until some time in June, 1901. Meantime their stations will be marked with markers of the same color as the buoys they replace, viz:

Point Abbaye Shoal (N.) buoy, black;
Point Abbaye Shoal (S.E.) buoy, red.

MACKINAC SPIT GAS BUOY, NO. 22.

Notice is hereby given that on the opening of navigation, 1901, there will be established, in 16 feet of water, in place of the former red third-class can buoy, on the southerly end of the spit, making off the southerly point of Mackinac Island, northerly side of the north channel of the Straits of Mackinac, a red conical buoy, surmounted by a pyramidal lattice-work supporting the lantern, showing a fixed red light during the periods of 10 seconds separated by eclipses of 10 seconds' duration, and marked "Mackinac Spit No. 22."

Southeasterly end of Mackinac Island, N.E. by N.;
Round Island Light-House, S., about 3,000 feet ($\frac{7}{12}$ mile).
Bearings are true; miles are statute miles.

VIDAL SHOALS CHANNEL RANGE LIGHT STATION.

Notice is hereby given that, at the opening of navigation, 1901, changes, as follows, will be made in the lights at this station:

Rear light, near the railroad embankment, at the southerly end of the International Railroad bridge, and about 1,400 feet (¼ mile) E.N.E. ¾ E. in rear of the front light, will be changed from a fifth-order light, showing fixed white varied by a red flash every minute, to a lens-lantern light showing fixed red. No change will be made in the height of the light or the appearance of the structure from which it is shown.

Front light, on the outer end of the north pier at the westerly entrance of St. Mary's Falls canal, will be changed from a fourth-order light, showing fixed red, to a fifth-order light showing fixed white varied by a red flash every 40 seconds. No change will be made in the height of the light or the appearance of the structure from which it is shown.

By order of the Light-House Board:

FRANCIS J. HIGGINSON,
Rear Admiral, U. S. Navy, Chairman.

SHIPPING AND MARINE JUDICIAL DECISIONS.

(COLLABORATED SPECIALLY FOR THE MARINE RECORD.)

Action for Damages—Burden of Proof.—The burden rests upon the carrier to prove that damage to cargo, occurring after its receipt and before its delivery, was due to a peril of the sea, within the exemption contained in its bills of lading. The Frey, 106 Fed. Rep. (U. S.) 319.

Shipping—Damage to Cargo—Perils of the Sea.—Where the excessive violence of the sea is the efficient cause of the shifting of cargo, causing breakage and leakage, by which other portions of the cargo are damaged, without which the damage would not have occurred, it is the proximate cause of such damage; and whether it constitutes a peril of the sea, within the exception in the bills of lading, is a question of fact, to be determined upon the circumstances of each case, depending upon whether a seaworthy vessel, properly trimmed and with the cargo properly stowed, would ordinarily go through such seas without material injury to its cargo. The Frey, 106 Fed. Rep. (U. S.) 319.

Admiralty—Appeal—Insufficiency of Evidence.—In a suit to charge a tug with liability for the loss of a tow, the evidence was such as to establish gross fault on the part of the tug, and to create a strong presumption against her; but upon the issue whether the loss was due to such fault neither party produced evidence which it was apparently within its power to produce, and without which the court on appeal was left to mere conjecture as to material facts, and unable to reach a satisfactory decision. Held, that the case would be remanded to the district court for further proofs, and if none were offered the libel should be dismissed. The Carbonero, 106 Fed. Rep. (U. S.) 329.

Shipping—Injury to Cargo from Leakage—Negligent Management of the Ship.—The ballast tank of an ocean steamer sprung a leak during a voyage, and the water accumulated in the hold above in sufficent quantity to damage the cargo stowed therein. The leak was known to the engineer and carpenter, who failed to report it to the chief officer, to give it a proper examination, or to use the pumps with sufficient frequency to prevent the accumulation of water in the hold. The pump was sufficient, and the proper use of it would have prevented injury to the cargo. Held, that such negligence was the direct cause of the injury, and constituted negligence in the "management of the ship," for which the carrier was exempted from liability by section 3 of the Harter act. The Ontario, 106 Fed. Rep. (U. S.) 324.

Towage—Loss of Tow—Liability of Tug.—The Carbonero, a powerful ocean tug, went to sea from Vineyard Haven, in heavy southwest weather, with three barges in tow; two of the barges being the St. Nicholas and the Excelsior. Although, after sailing, the weather became heavier, the tug did not put back, and finally was compelled to proceed with its tow to an intermediate anchorage. The St. Nicholas and Excelsior dragged their anchors and were finally lost. Held, in a suit by the owners of the barges against the tug, that the evidence as to the state of the weather was insufficient to sustain the charge that the tug was in fault either for going to sea, for not returning to port, or for anchoring where she did; also, that as to the St. Nicholas the tug rendered all the assistance which was possible, and was not in fault. The Carbonero, 106 Fed. Rep. (U. S.) 329.

Duty of Tug—Burden of Proof.—Unless under extraordinary circumstances, it is the duty of a tug which has been compelled by stress of weather to anchor with her tow to promptly render all practicable assistance to a tow which is in peril; and where a barge, constituting a part of a tow anchored under such circumstances, dragged her anchor and began to drift, and the tug, on attempting to weigh anchor, found that her donkey engine would not work, a delay of two and one-half hours, and until after the barge had drifted out of sight, before shipping her cable to go to the assistance of the tow, was a breach of the contract of towage and also gross negligence; but, such negligence not being a statutory fault, the burden does not rest upon the tug of proving that she could not have rescued the barge by dilligent action, and to charge her with liability for the loss of the barge it must be shown by libelant, in accordance with the usual course in admiralty, that such loss was in fact due to her fault. The Carbonero, 106 Fed. Rep. (U. S.) 329.

VISIBLE SUPPLY OF GRAIN.

As compiled for THE MARINE RECORD, by George F. Stone, Secretary Chicago Board of Trade.

CITIES WHERE STORED.	WHEAT. Bushels.	CORN. Bushels.	OATS. Bushels.	RYE. Bushels.	BARLEY Bushels.
Buffalo	1,649,000	.....	.....	18,000	255,000
" afloat	673,000	.....	.....	.....	.....
Chicago	11,223,000	5,107,000	2,855,000	486,000	226,000
" afloat	734,000	3,438,000	1,344,000	26,000	.....
Detroit	399,000	446,000	1,000	30,000	19,000
Duluth	9,613,000	5,183,000	1,259,000	391,000	77,000
Fort William, Ont.	1,914,000	.....	.....	.....	.....
Milwaukee	1,099,000	657,000	787,000	1,000	21,000
" afloat	.....	228,000	322,000	.....	72,000
Montreal	138,000	12,000	355,000	9,000	11,000
Port Arthur, Ont.	250,000	.....	.....	.....	.....
Toledo	916,000	1,311,000	404,000	2,000	1,000
Toronto	70,000	.....	2,000	.....	30,000
Grand Total	53,890,000	21,990,000	11,399,000	1,112,000	856,000
Corresponding Date, 1899	55,412,000	23,019,000	7,474,000	1,276,000	712,000
Increase	.....	.....	243,000	3,000	.....
Decrease	859,000	297,000	.....	.....	262,000

While the stock of grain at lake ports only is here given the total shows the figures for the entire country except the Pacific Slope.

ATLANTIC, RIVER AND LAKE NAVIGATION.

F. H. Clergue, of Sault Ste. Marie, says that four steamers are now loading in the Bristol channel for Sault Ste. Marie. They will be loaded to fourteen feet draft for the St. Lawrence canal and river trip, but will cross the Atlantic drawing eighteen feet, the difference to be a cargo for Montreal. When the steamers get into Lake Erie they will take coal, making their draft eighteen feet again, or to the limit of lake navigation.

THE WORLD'S MERCHANT MARINE AND SHIP-BUILDING.

The Frankfurter Zeitung, of January 8, 1901, contains an article devoted to the merchant marine of the world, and to the shipbuilding industry, which presents some interesting observations and data.

Attention is called to the fact that the enormous growth of production has found a mighty ally in the means of transportation, which have kept pace with it.

Without railroads and steamships, the production of cereals in North America and Australia would not have been so widely developed, as the products could not have been utilized, except by immigration, from overpopulated countries; nor would the gigantic metal, textile, and other industries of Germany have attained their present growth.

The expansion of ocean navigation and the resultant lowering of freights is regretted by the German agrarians, as it has cost them the loss of monopoly in the production of articles of food which they formerly enjoyed; at the same time it is the cause of the marvelous growth of German industries, not only for export, but also for home consumption, because the development and improvement of ocean navigation supplied the demand for raw materials at reduced cost.

The steamers now use triple and quadruple expansion engines, thereby greatly lessening the duration of the voyage; these and improved furnaces save much fuel for the trips, while the less amount of coal required gives more storage for freight. The freight capacity of modern steamers has increased fully one third, while the expense has been reduced.

The merchant steam marine of the world has grown immensely, as the following figures illustrate:

Year.	Number of vessels.	Registered tons.	
		Gross.	Net.
1874	5 865	5,226 000	3,471,000
1884	8,433	10,209,000	6,675,000
1894	10,744	15 657 000	9 994,000
1896	11,155	17,089,000	10,761,000
1898	11,576	18,887,0 0	11,687,000
1899	11,756	19 711,000	12,165,000
1900	12,289	21,787,000	13,465,000

The steam fleet, in numbers, has a little more than doubled in twenty-six years; in tonnage, it has quadrupled.

The reverse has been true of sailing vessels. In this case, there is hardly any difference between the gross and net tonnage.

Year.	Number of vessels.	Registered tons.
1874	56,289	14,523,000
1884	44,734	13,000,000
1894	29 333	9,547,000
1896	29 248	9,136,000
1898	28,885	8,693,000
1899	27,867	8,347,000
1900	27,982	8,205,000

In the short space of twenty-six years, the transportation capacity of the world's merchant marine has increased 250 per cent.

The growing importance of the part which Germany takes in this line of trade has often been pointed out. Germany to-day, not only with reference to merchant steamers, but also to the world's merchant fleet, occupies the place next to Great Britain, which is all the more notable as the United States includes in its tonnage the vessels on the Great Lakes.

The relative position of the principal flags in the fall of 1900 was:

Country.	Steamers.	Sailing vessels.	Total.
	Tons.	Tons.	Tons.
England	11,859,000	2,513,000	14 362,000
Germany	2,169,000	551,000	2,720,000
United States	1,183,000	1,360,000	2,543,000
Norway	769,000	898,000	1,667,000
France	1,060,000	341,000	1,401,000

England owns considerable more than half of all the steamers in the world. In the building of ships, that country makes a still better showing. British shipyards work in a very large measure for foreign countries.

At the end of the third quarter of 1900, there were being constructed:

Country.	Steamers.	Sailing vessels.	Total.
	Tons.	Tons.	Tons.
Great Britain	1,192,000	12,000	1,204,000
United States	142,000	13,000	153,000
Germany	147,000	5 000	152,000
Italy	103,000	1,000	104,000
France	63,000	55,000	118,000
Holland	26,000	8,000	34,000

In the years 1898 and 1899, Germany held second place in ship-building, but, for various reasons, the shipbuilding in 1900 has received such an impetus in the United States that it has placed Germany third.

SUMMARY OF ICE CONDITIONS.

According to the Weather Bureau advices, compiled by Mr. Norman B. Conger, inspector and marine agent, Detroit, the reports indicate that the ice is wasting steadily over western Superior, while over the east portion the ice fields remain in about the same condition as last week; the ice in the St. Mary's river is decreasing in thickness with open water in Hay Lake. The ice in Green Bay is wasting slowly but still covers the bay; there is very little ice reported in Lake Michigan south of Beaver Island, and the ice is reported breaking at the Straits. In Lake Huron the ice is confined to the southern end, and extends, in one large field, from Harbor Beach to Port Huron, the northerly winds of the past week having moved all the fields southward; the ice bridge at the mouth of the lake is still intact, but small portions break off and move down the river, and St. Clair river is reported full of ice from Algonac northward nearly to Port Huron. The ice in Erie appears to be confined to the eastern end and the field is breaking up. There is but little ice reported in Ontario.

In comparison with same period last year, the conditions are about the same over Superior and St. Mary's river, but less ice is reported in Michigan and at the Straits. There is more ice in southern Huron and St. Clair river. In Erie there is considerably less ice reported this year and the field is badly broken up. No change in Ontario.

A report will be issued on the 16th, and special telegraphic reports will be issued in case the ice breaks at the Straits or at the mouth of Lake Huron. Present indication point to the opening of navigation about April 20th.

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670,942. Folding boat. H. Traub, Pekin, Ills.

670,995. Construction of boat hulls. J. Moore. Lansingburg, New York.

671,088. Hydraulic propeller, 671,089. Hydraulic propeller. J. Morton, Oakland, Cal.

LAPLAND IRON ORE.

According to a report from Richard Guenther, United States consul general at Frankfort, a new harbor is being constructed at the north of the Scandinavian peninsula, for the chief purpose of shipping the immense quantities of iron ore found in Lapland. The iron mines of Gellivare and Luossovaara have been developed to such an extent within the last ten years that better facilities for export of the ore have become an urgent necessity. The new harbor will be named Victoria harbor, and its entire northern shore of more than half a mile will be used exclusively for the shipment of ore produced in the above-named mining districts.

The harbor will be constructed after the plans of that of Duluth, Minn. The total cost of the docks and buildings is estimated at $800,000; the cost of the docks proper at about $650,000.

Of late, new iron deposits of enormous extent have been discovered in Lapland, and steps for developing them have been taken.

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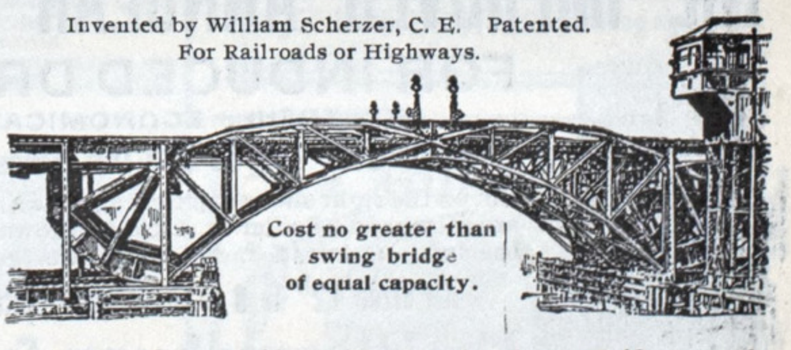

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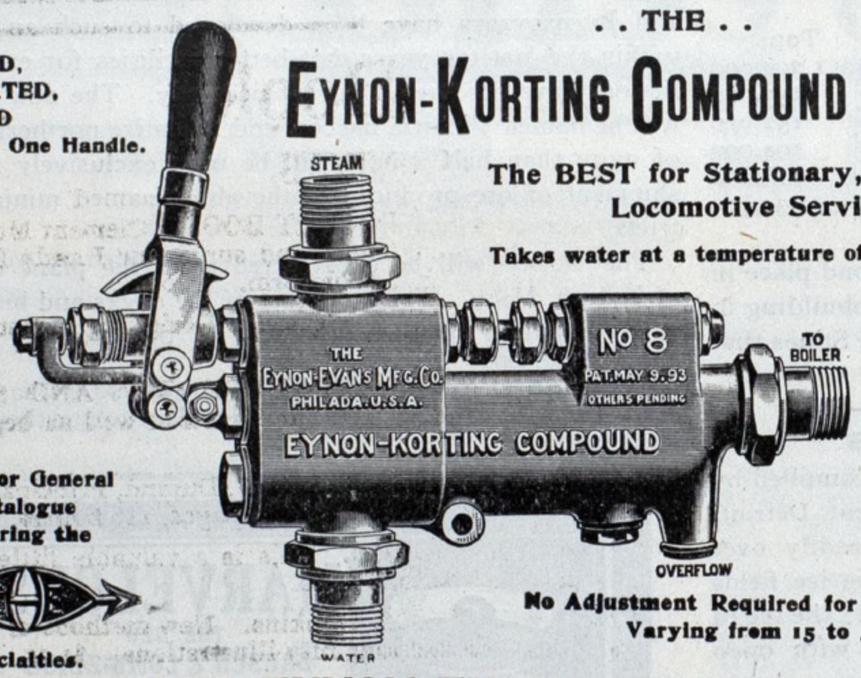

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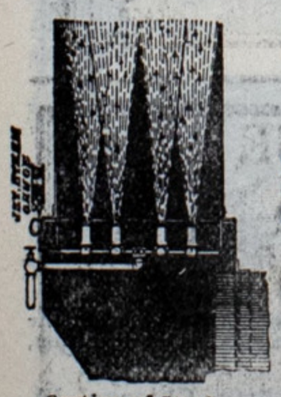

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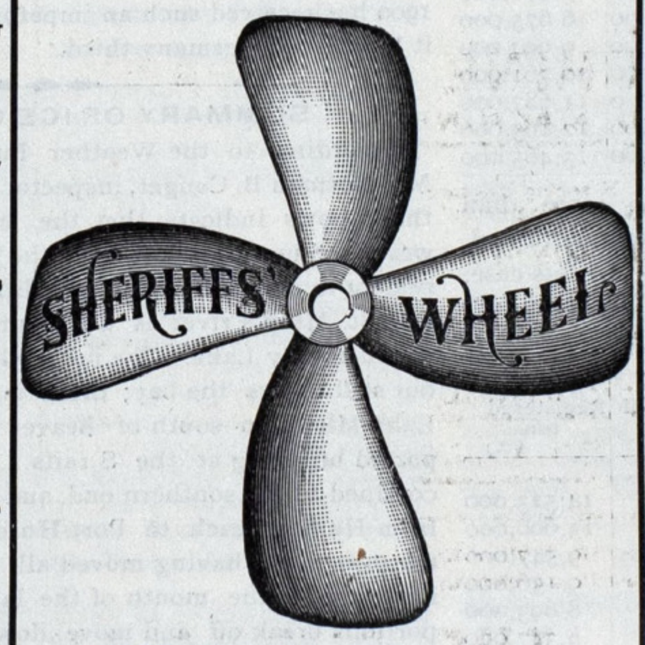

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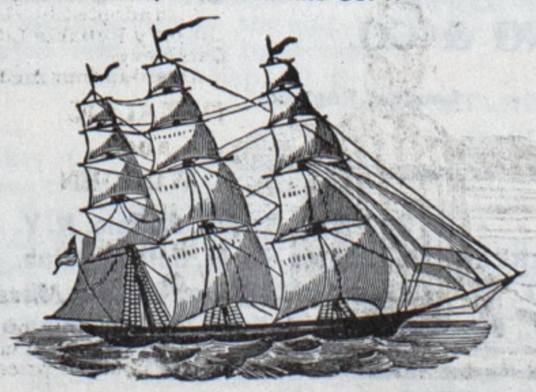

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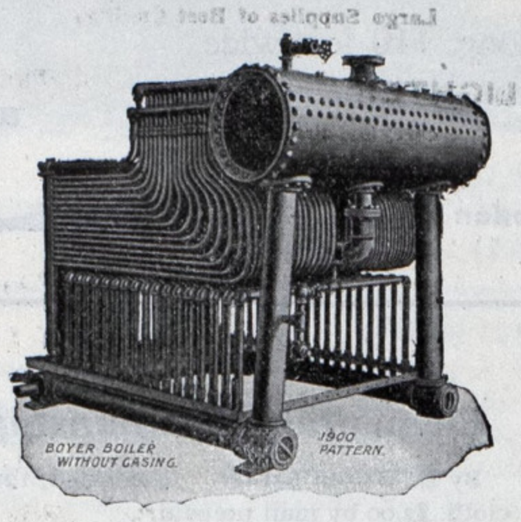

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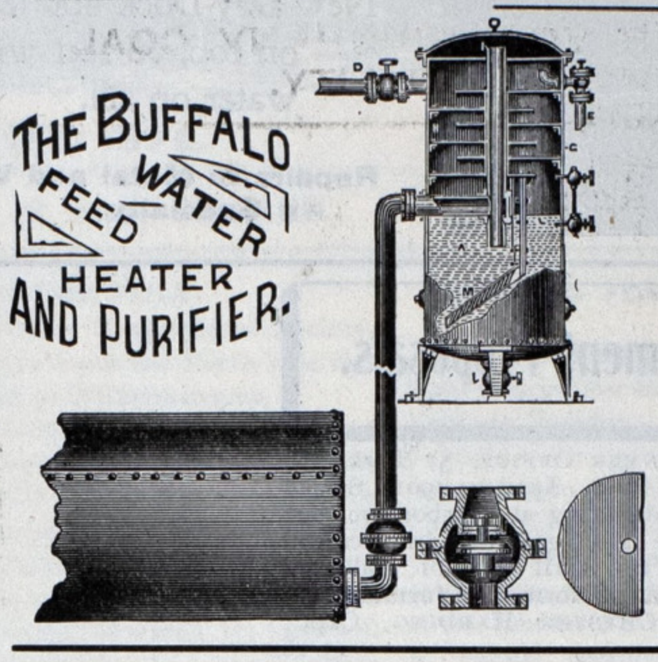

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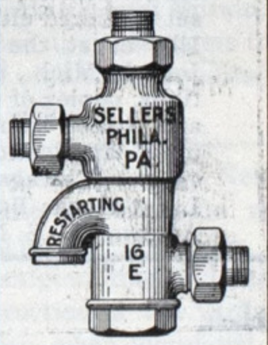

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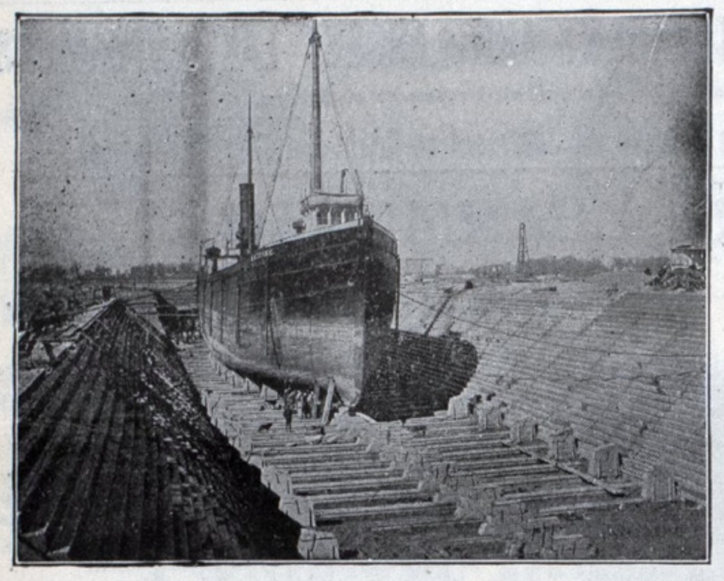

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U. S. ENGINEER OFFICE, Duluth, Minn., April 5, 1901. Sealed proposals will be received here until noon, April 20, 1901, and then publicly opened, for furnishing and placing riprap at Duluth ship canal. Information on application. D. D. GAILLARD, Capt. Engrs. 15–16

SEALED PROPOSALS will be received at the office of the Light-House Engineer, Buffalo, N. Y., until 12 o'clock M., April 22, 1901, and then opened, for rebuilding the keepers' dwelling at Port Clinton, O., in accordance with specifications, copies of which, with blank proposals and other information, may be had upon application to Major T. W. SYMONS, Corps of Engineers, U. S. A. 13–14

U. S. ENGINEER OFFICE, Custom House, Cincinnati, O., April 9, 1901. Sealed proposals for one 30-foot length, flat-bottomed, steel-hulled, stern-wheeled steam launch complete, will be received here until 2 p. m., May 14, 1901, and then publicly opened. Information furnished on application. WM. H. BIXBY, Major, Engrs. 16–19

SEALED PROPOSALS will be received at the office of the Light-House Board, Treasury Department, Washington, D. C., until 2 o'clock p. m., April 30, 1901, and then opened, for furnishing the materials and labor of all kinds necessary for the construction and delivery of the light-house tender Sumac, for a fixed sum for said vessel delivered either in the harbor of Chicago, Ill., or at the Light-House Depot at St. Joseph, Mich., in accordance with specifications, copies of which, with blank proposals and other information, may be obtained upon application to the Light-House Inspector, Chicago, Ill., or at the office of the Light-House Board, F. J. HIGGINSON, Rear Admiral, U. S. Navy, Chairman. 14–15

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